FIG. 1

PRIOR ART

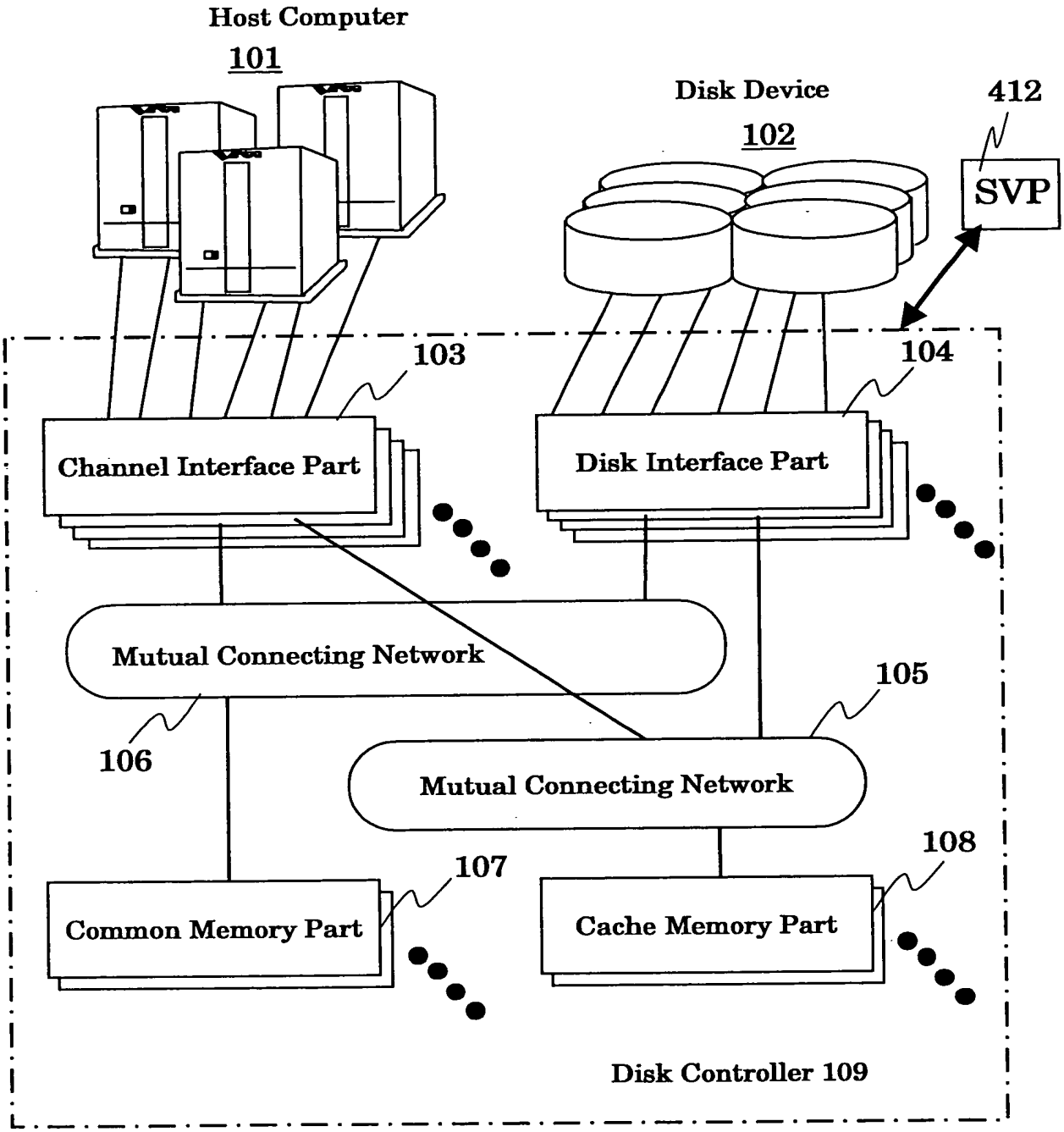


FIG. 2

PRIOR ART

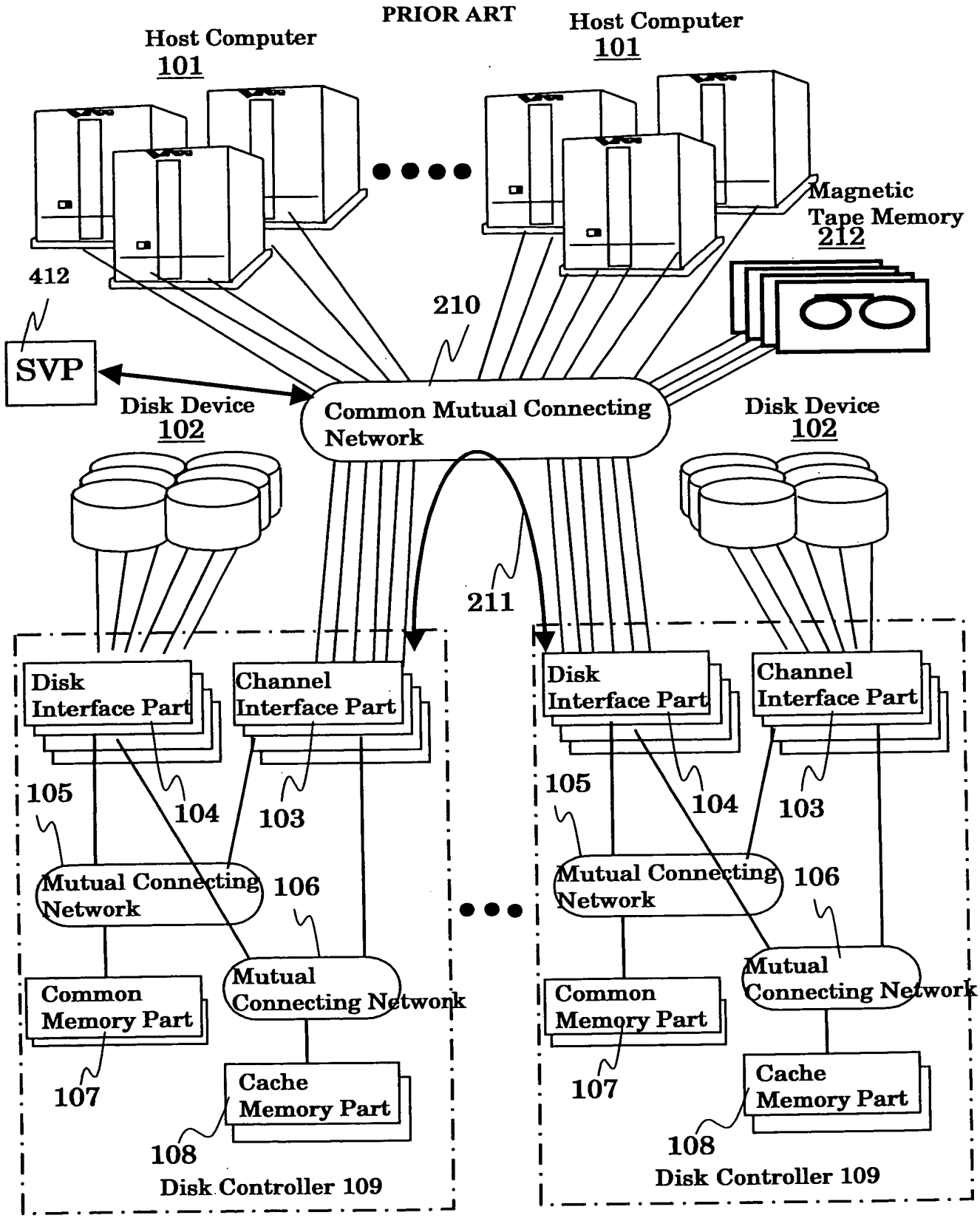
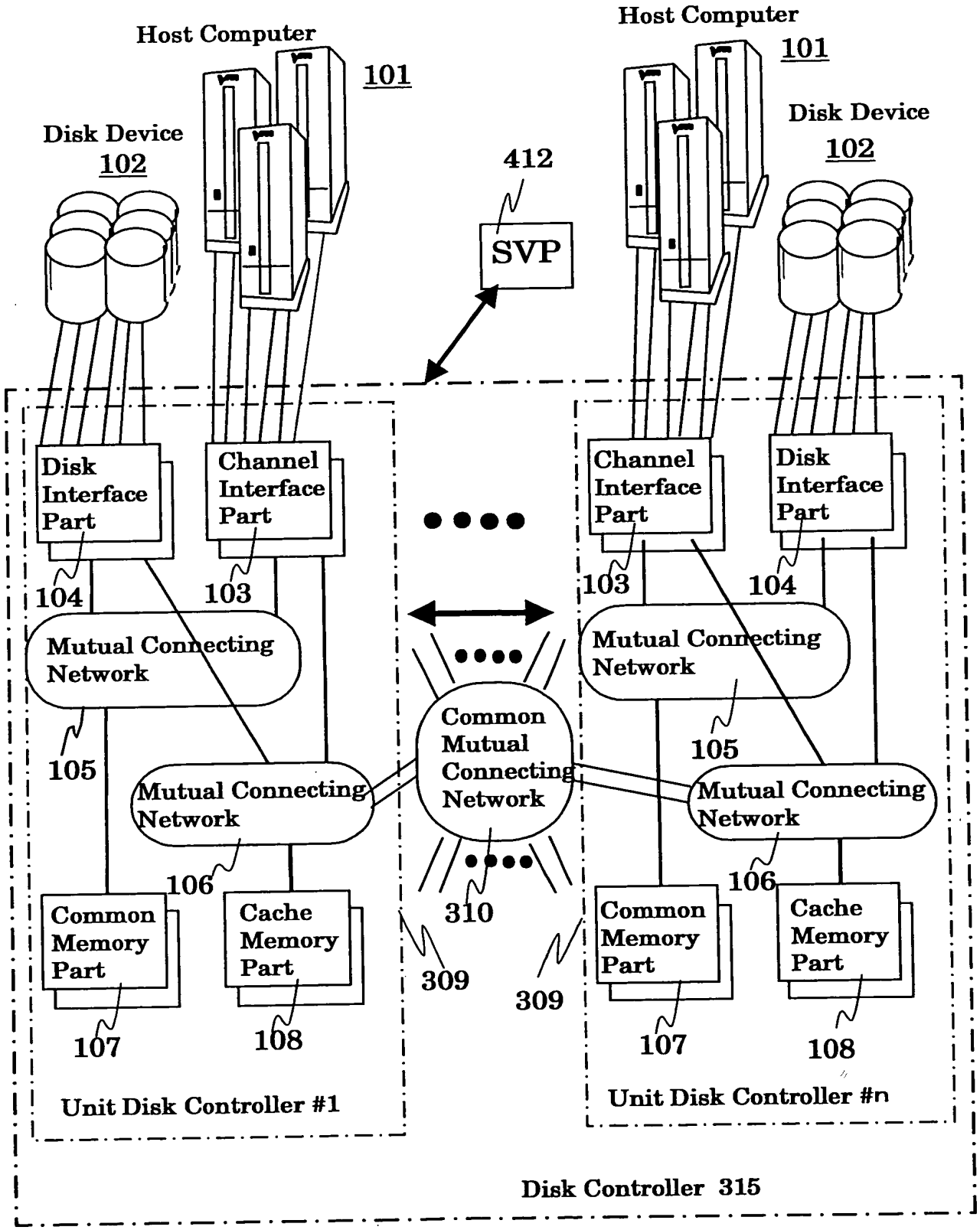


FIG. 3


Host Computer
101
Host Computer
101
Disk Device
102
Disk Device
102
412
SVP
Disk Interface Part
Channel Interface Part
Channel Interface Part
Disk Interface Part
104
103
103
104
Mutual Connecting Network
Mutual Connecting Network
105
105
Common Mutual Connecting Network
Mutual Connecting Network
Mutual Connecting Network
106
106
310
Common Memory Part
Cache Memory Part
Common Memory Part
Cache Memory Part
309
309
107
108
107
108
Unit Disk Controller #1
Unit Disk Controller #n
Disk Controller 315

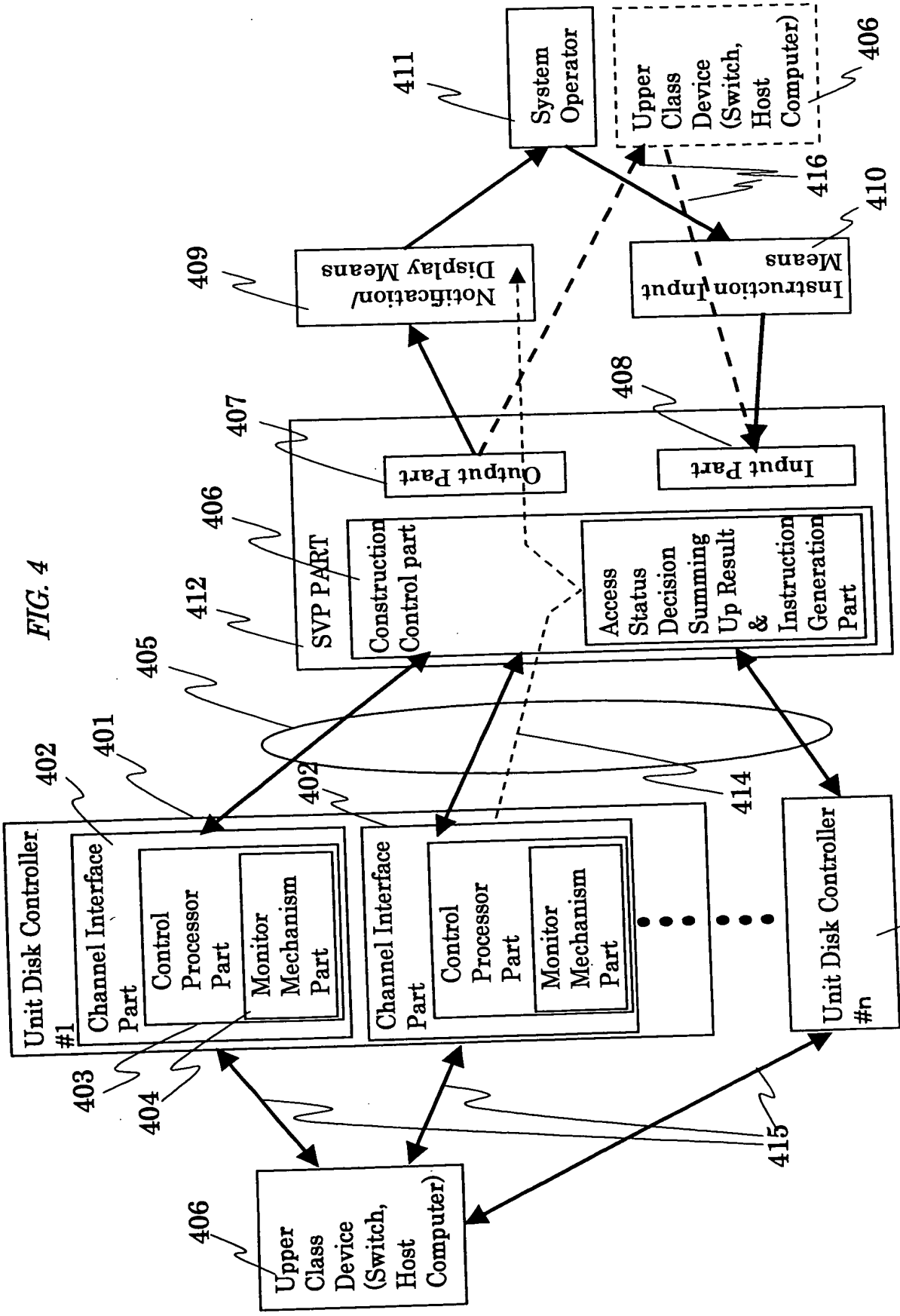

Unit Disk Controller #1
Channel Interface Part
Control Processor Part
Monitor Mechanism Part
Channel Interface Part
Control Processor Part
Monitor Mechanism Part
Unit Disk Controller #n
SVP PART
Construction Control part
Access Status Decision Summing Up Result & Instruction Generation Part
Output Part
Input Part
Notification/ Display Means
Instruction Input Means
System Operator
Upper Class Device (Switch, Host Computer)
Upper Class Device (Switch, Host Computer)
401
402
403
404
405
406
407
408
409
410
411
412
414
415
416

FIG. 4

FIG. 5

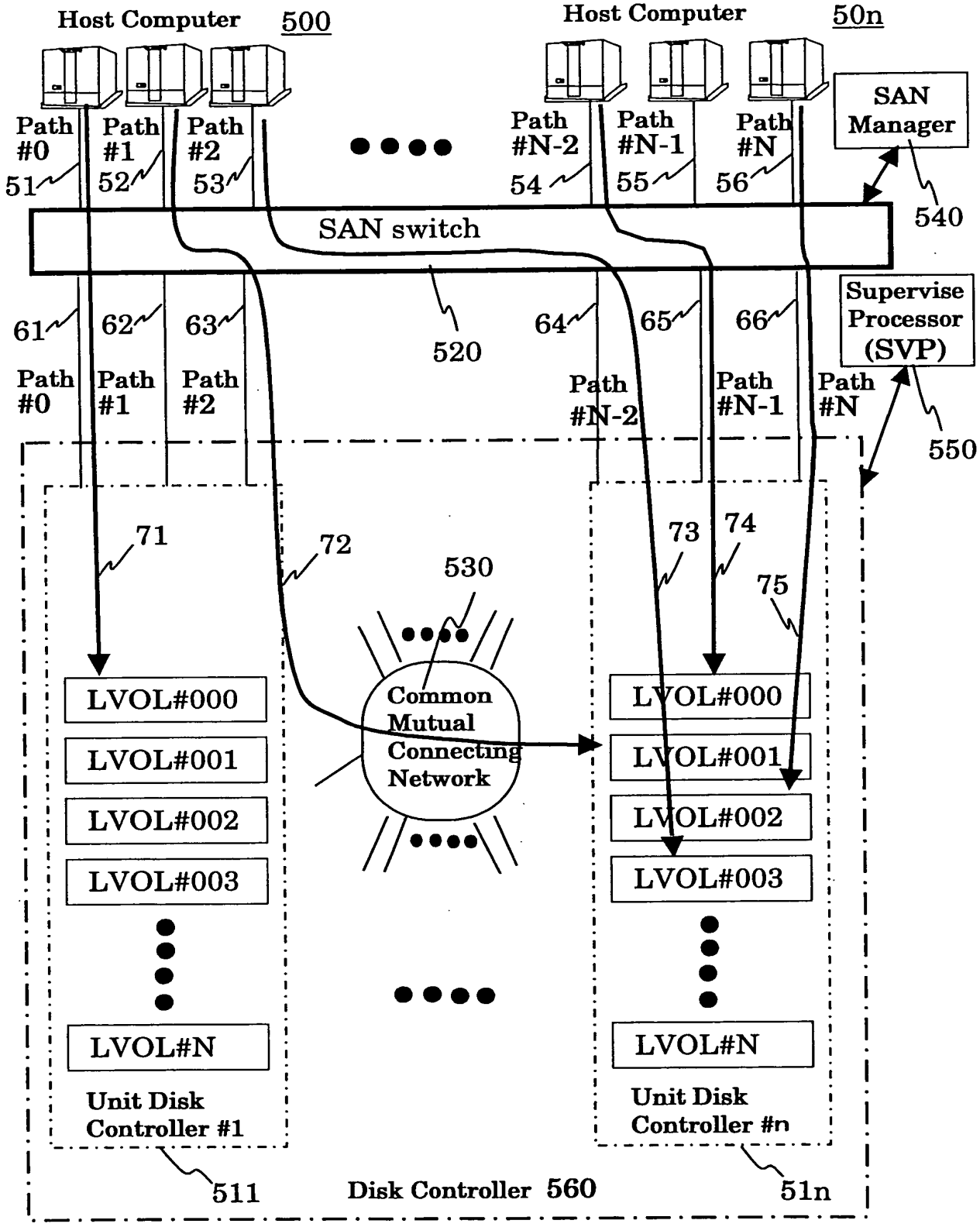
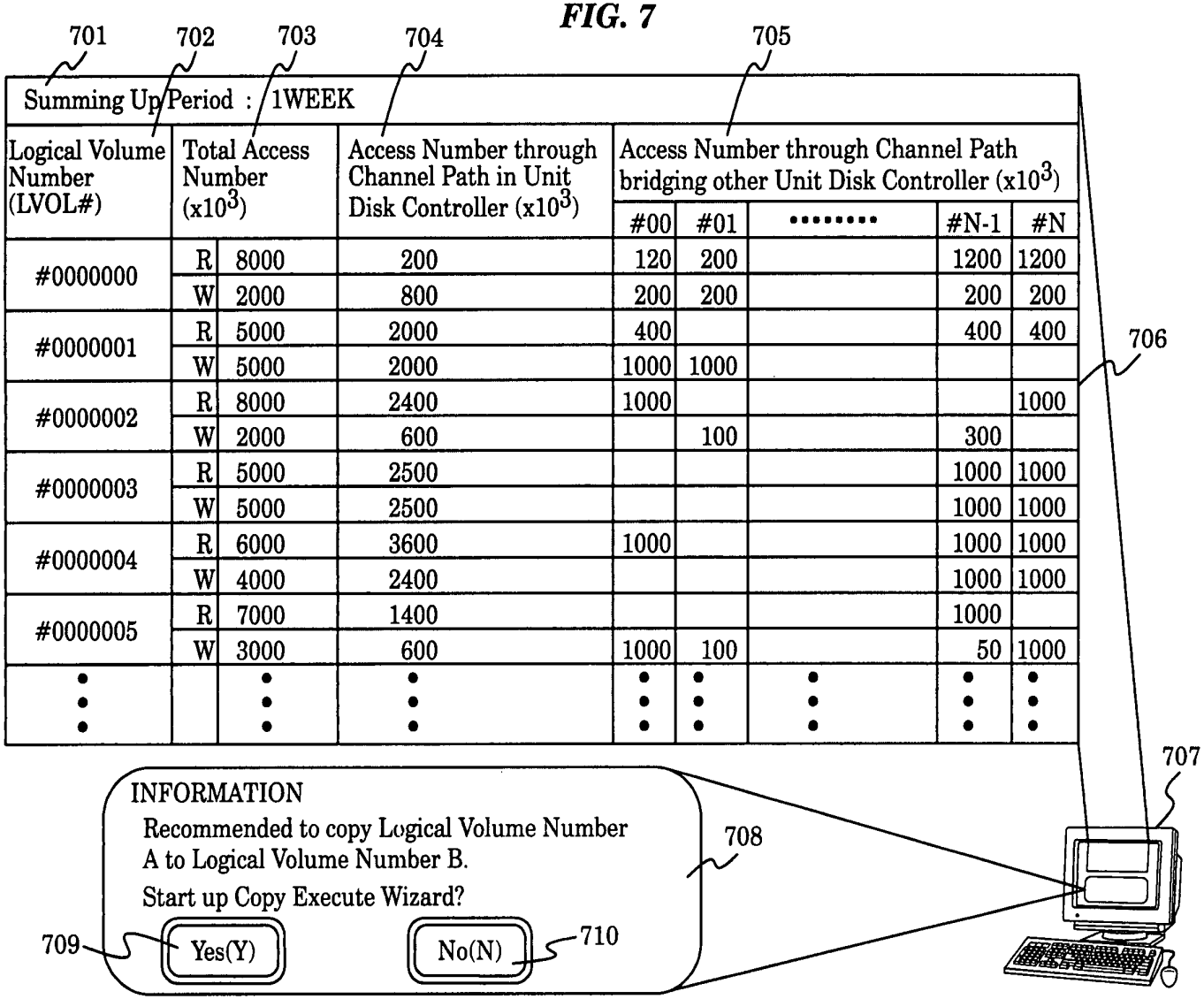

Host Computer 500
Host Computer 50n
SAN Manager
Path #0
Path #1
Path #2
Path #N-2
Path #N-1
Path #N
51
52
53
54
55
56
540
SAN switch
Supervise Processor (SVP)
61
62
63
64
65
66
520
550
71
72
73
74
75
530
LVOL#000
LVOL#001
LVOL#002
LVOL#003
LVOL#N
Common Mutual Connecting Network
Unit Disk Controller #1
Unit Disk Controller #n
511
Disk Controller 560
51n

FIG. 6

Accessing Logical Path	Host Side Path	Disk Side Path	Logical Volume Number
71	51	61	#0000000(Corresponding to LVOL #000 of Unit Disk Controller #0)
72	52	63	#N−m(Corresponding to LVOL #001 of Unit Disk Controller #n)
● ● ●	● ● ●	● ● ●	● ● ●
73	53	64	#N−m+2(Corresponding to LVOL #003 of Unit Disk Controller #n)
74	54	65	#N−m−1(Corresponding to LVOL #000 of Unit Disk Controller #n)
75	56	66	#N−m+1(Corresponding to LVOL #002 of Unit Disk Controller #n)

FIG. 7



Logical Volume Number (LVOL#)		Total Access Number (x10^3)	Access Number through Channel Path in Unit Disk Controller (x10^3)	Access Number through Channel Path bridging other Unit Disk Controller (x10^3)				
				#00	#01	•••••••	#N-1	#N
#0000000	R	8000	200	120	200		1200	1200
	W	2000	800	200	200		200	200
#0000001	R	5000	2000	400			400	400
	W	5000	2000	1000	1000			
#0000002	R	8000	2400	1000				1000
	W	2000	600		100		300	
#0000003	R	5000	2500				1000	1000
	W	5000	2500				1000	1000
#0000004	R	6000	3600	1000			1000	1000
	W	4000	2400				1000	1000
#0000005	R	7000	1400				1000	
	W	3000	600	1000	100		50	1000
• • •		• • •	• • •	• • •	• • •	• • •	• • •	• • •

FIG. 8

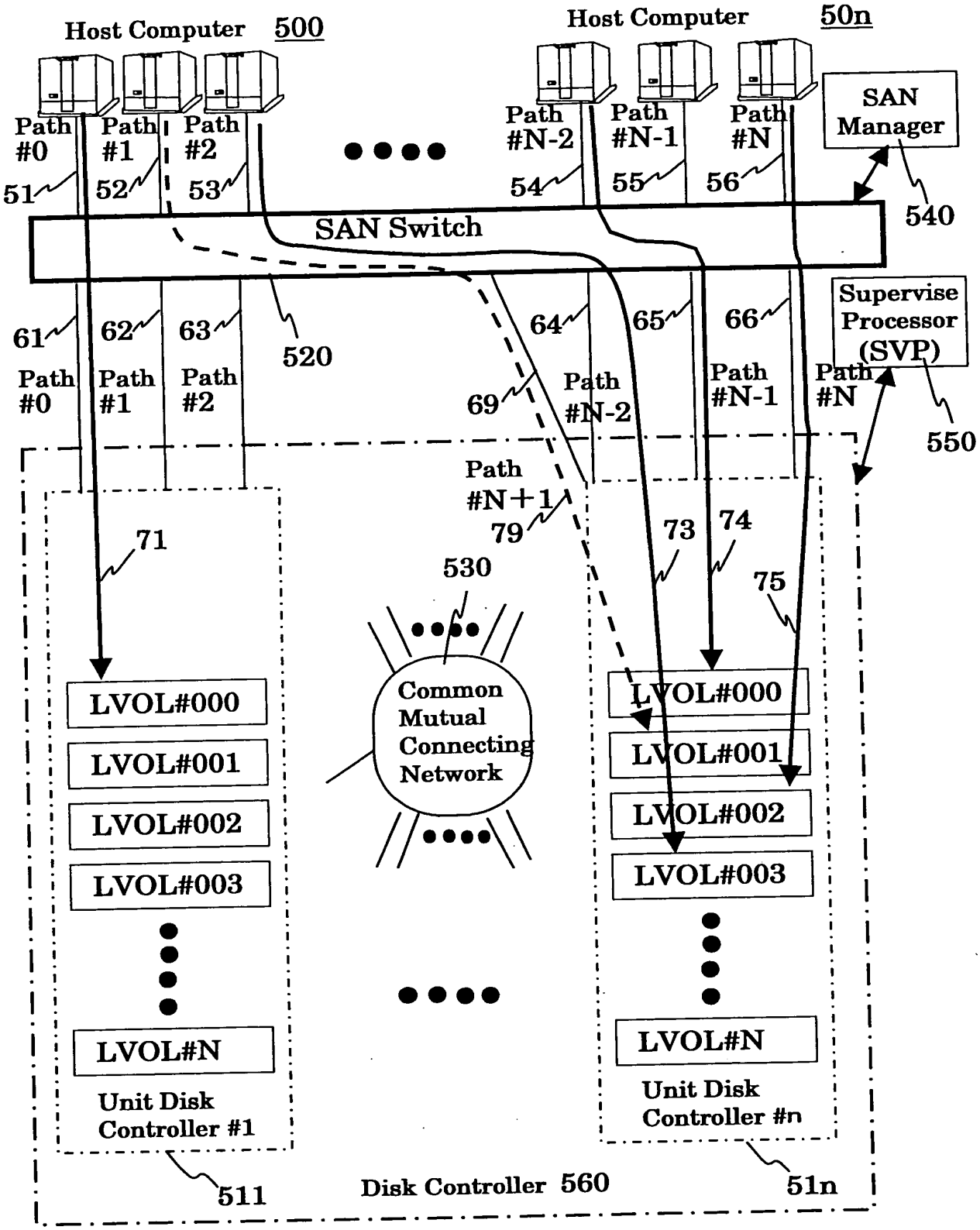

Host Computer 500
Host Computer 50n
Path #0
Path #1
Path #2
Path #N-2
Path #N-1
Path #N
SAN Manager
SAN Switch
540
51
52
53
54
55
56
61
62
63
520
64
65
66
Supervise Processor (SVP)
550
69
Path #N+1
79
71
73
74
75
530
Common Mutual Connecting Network
LVOL#000
LVOL#001
LVOL#002
LVOL#003
LVOL#N
Unit Disk Controller #1
Unit Disk Controller #n
511
Disk Controller 560
51n

FIG. 9

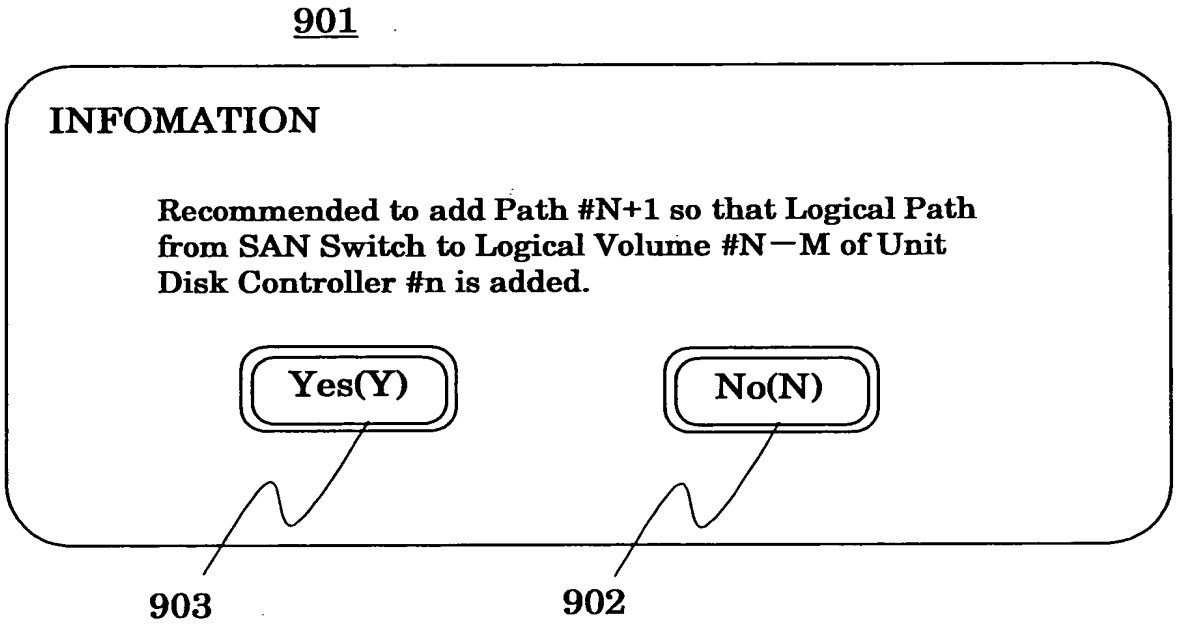

901
INFOMATION
Recommended to add Path #N+1 so that Logical Path from SAN Switch to Logical Volume #N−M of Unit Disk Controller #n is added.
Yes(Y)
No(N)
903
902

FIG. 10

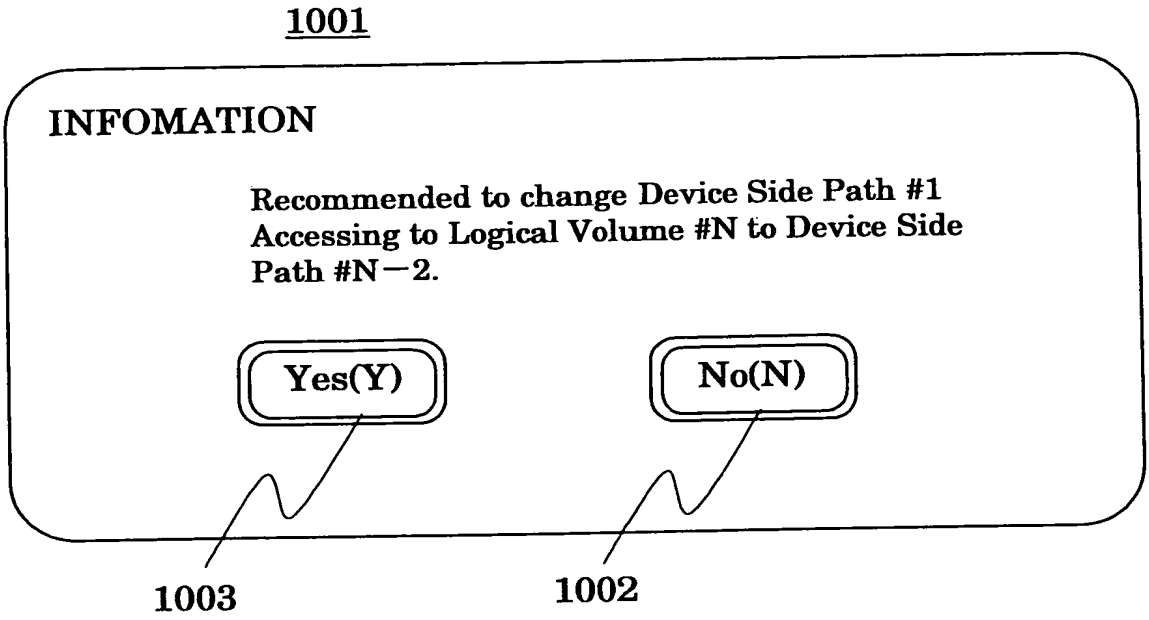

1001
INFOMATION
Recommended to change Device Side Path #1 Accessing to Logical Volume #N to Device Side Path #N−2.
Yes(Y)
No(N)
1003
1002

FIG. 11

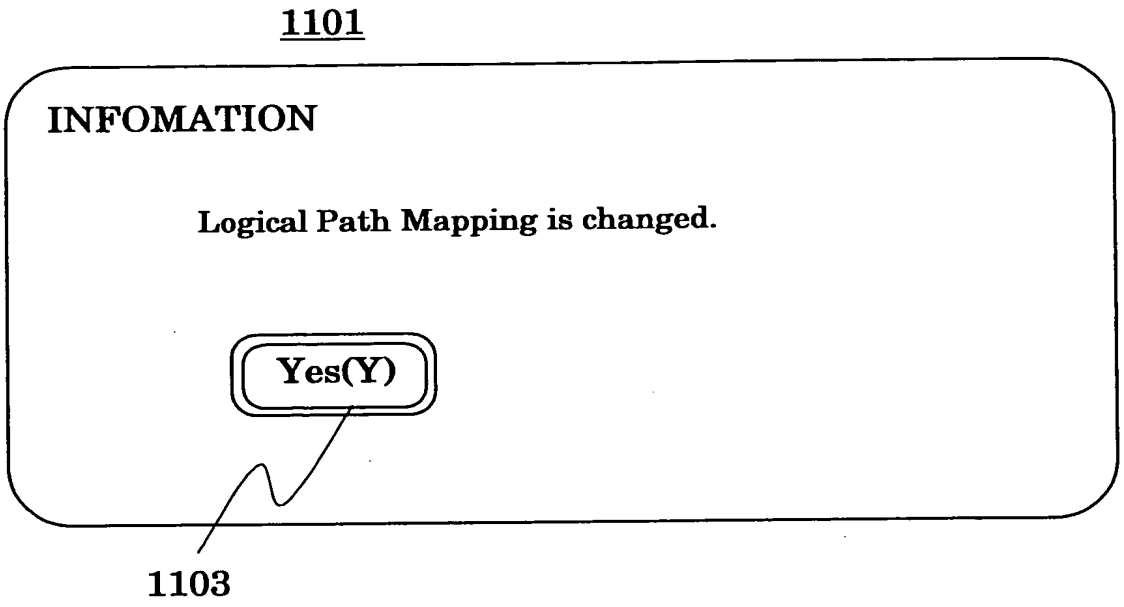


FIG. 12

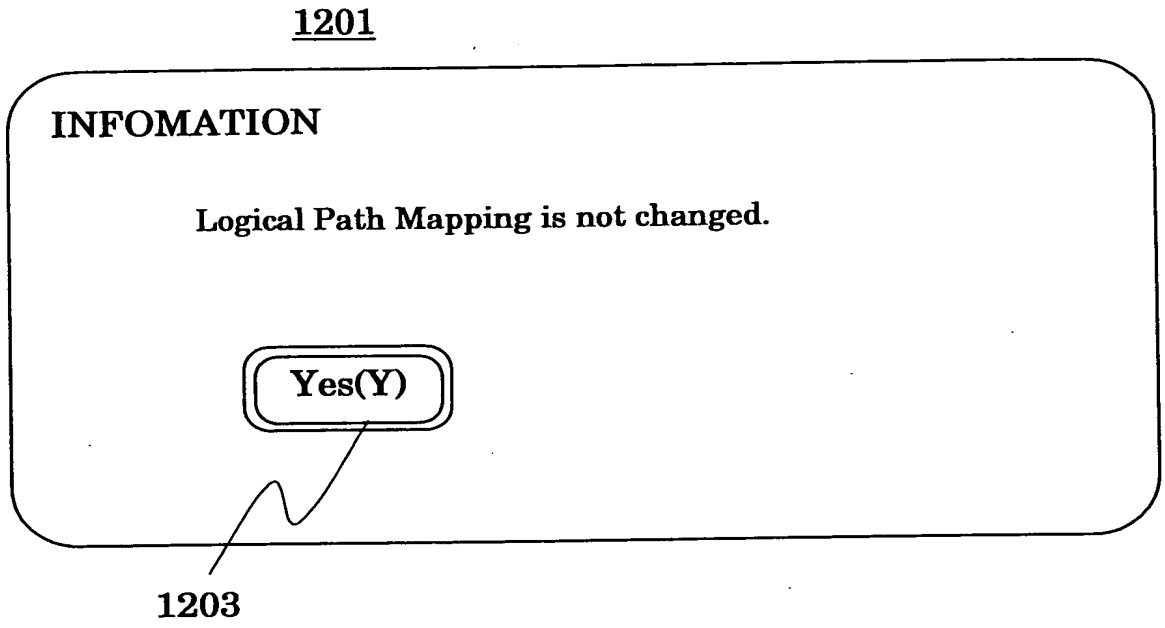
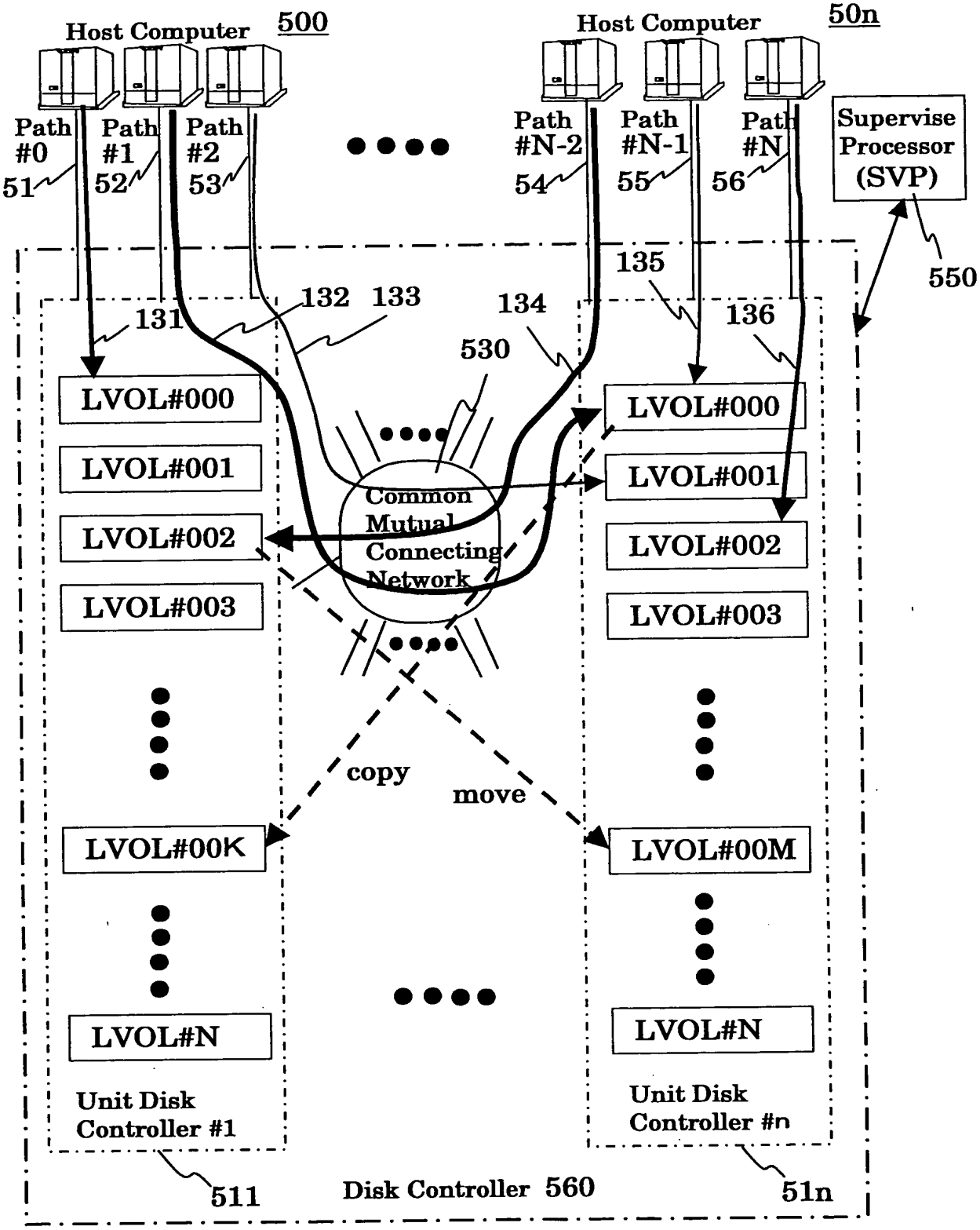

1201
INFOMATION
Logical Path Mapping is not changed.
Yes(Y)
1203

FIG. 13


Host Computer
500
Host Computer
50n
Path #0
51
Path #1
52
Path #2
53
Path #N-2
54
Path #N-1
55
Path #N
56
Supervise Processor (SVP)
550
135
131
132
133
134
136
530
LVOL#000
LVOL#001
LVOL#002
LVOL#003
LVOL#000
LVOL#001
LVOL#002
LVOL#003
Common Mutual Connecting Network
copy
move
LVOL#00K
LVOL#00M
LVOL#N
LVOL#N
Unit Disk Controller #1
Unit Disk Controller #n
511
Disk Controller 560
51n

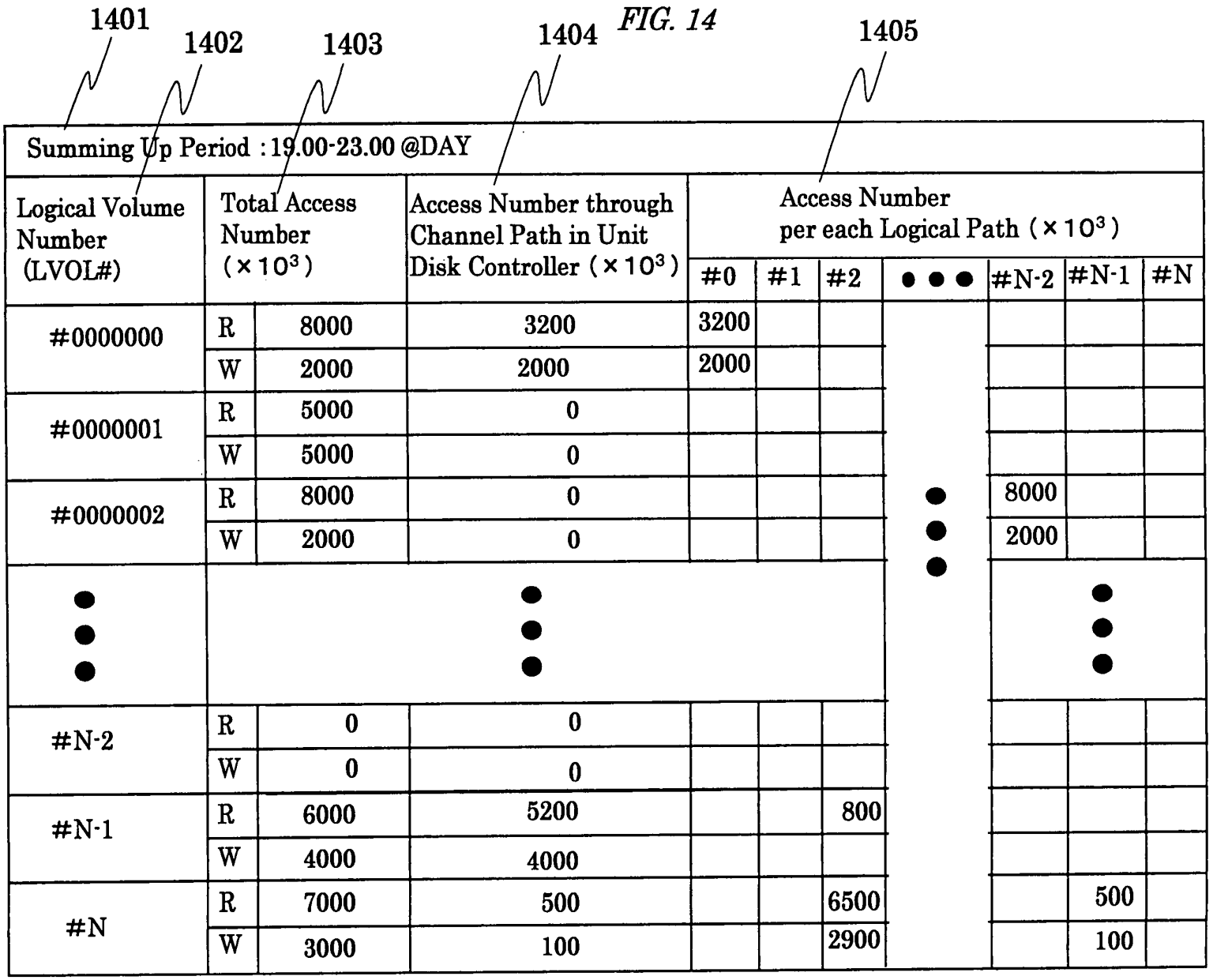


FIG. 14

Summing Up Period : 19.00-23.00 @DAY											
Logical Volume Number (LVOL#)	Total Access Number ($\times 10^3$)		Access Number through Channel Path in Unit Disk Controller ($\times 10^3$)	Access Number per each Logical Path ($\times 10^3$)							
				#0	#1	#2	● ● ●	#N-2	#N-1	#N
#0000000	R	8000	3200	3200						
	W	2000	2000	2000						
#0000001	R	5000	0							
	W	5000	0							
#0000002	R	8000	0				●	8000		
	W	2000	0				●	2000		
● ● ●	● ● ●		● ● ●				●		● ● ●	
#N-2	R	0	0							
	W	0	0							
#N-1	R	6000	5200			800				
	W	4000	4000							
#N	R	7000	500			6500			500	
	W	3000	100			2900			100	

FIG. 15

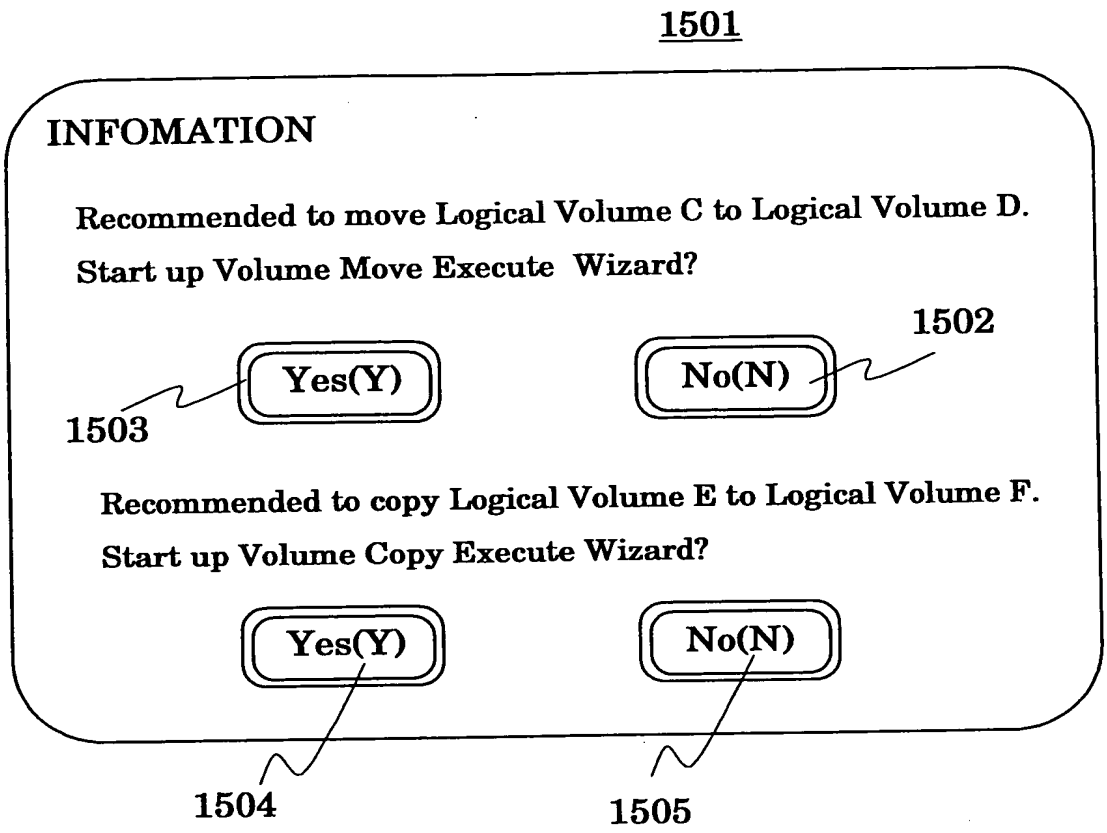

1501
INFOMATION
Recommended to move Logical Volume C to Logical Volume D.
Start up Volume Move Execute Wizard?
1502
Yes(Y)
No(N)
1503
Recommended to copy Logical Volume E to Logical Volume F.
Start up Volume Copy Execute Wizard?
Yes(Y)
No(N)
1504
1505

FIG. 16

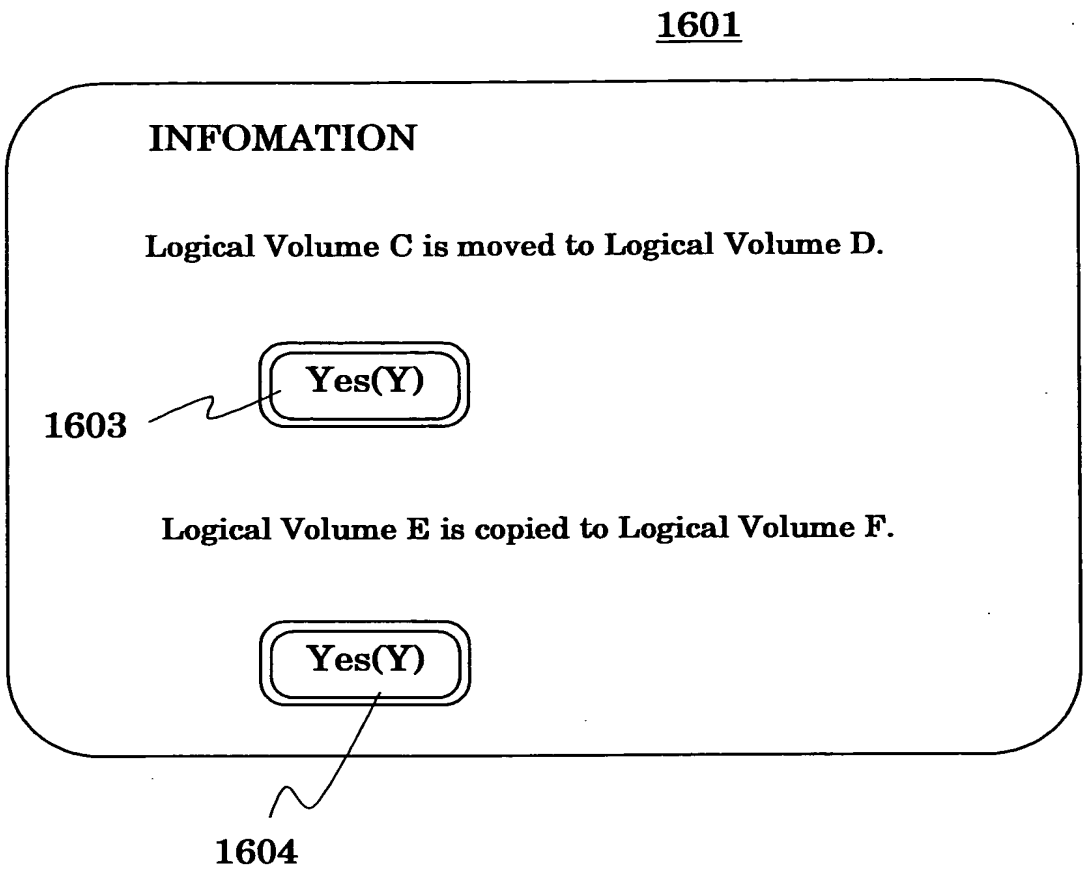

1601
INFOMATION
Logical Volume C is moved to Logical Volume D.
Yes(Y)
1603
Logical Volume E is copied to Logical Volume F.
Yes(Y)
1604

FIG. 17

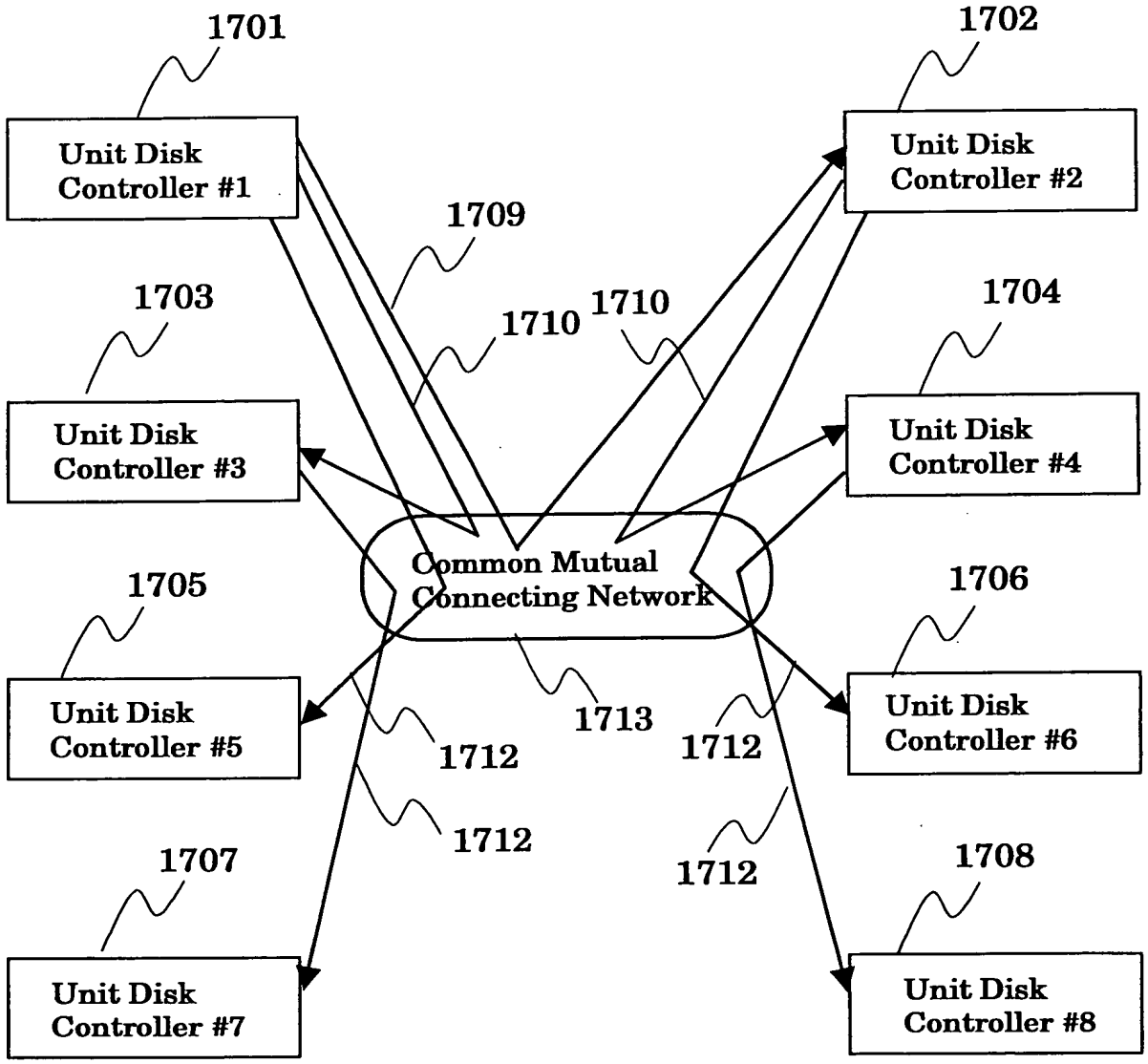

1701
Unit Disk Controller #1
1702
Unit Disk Controller #2
1709
1710
1710
1703
Unit Disk Controller #3
1704
Unit Disk Controller #4
Common Mutual Connecting Network
1705
Unit Disk Controller #5
1706
Unit Disk Controller #6
1713
1712
1712
1712
1712
1707
Unit Disk Controller #7
1708
Unit Disk Controller #8

FIG. 18

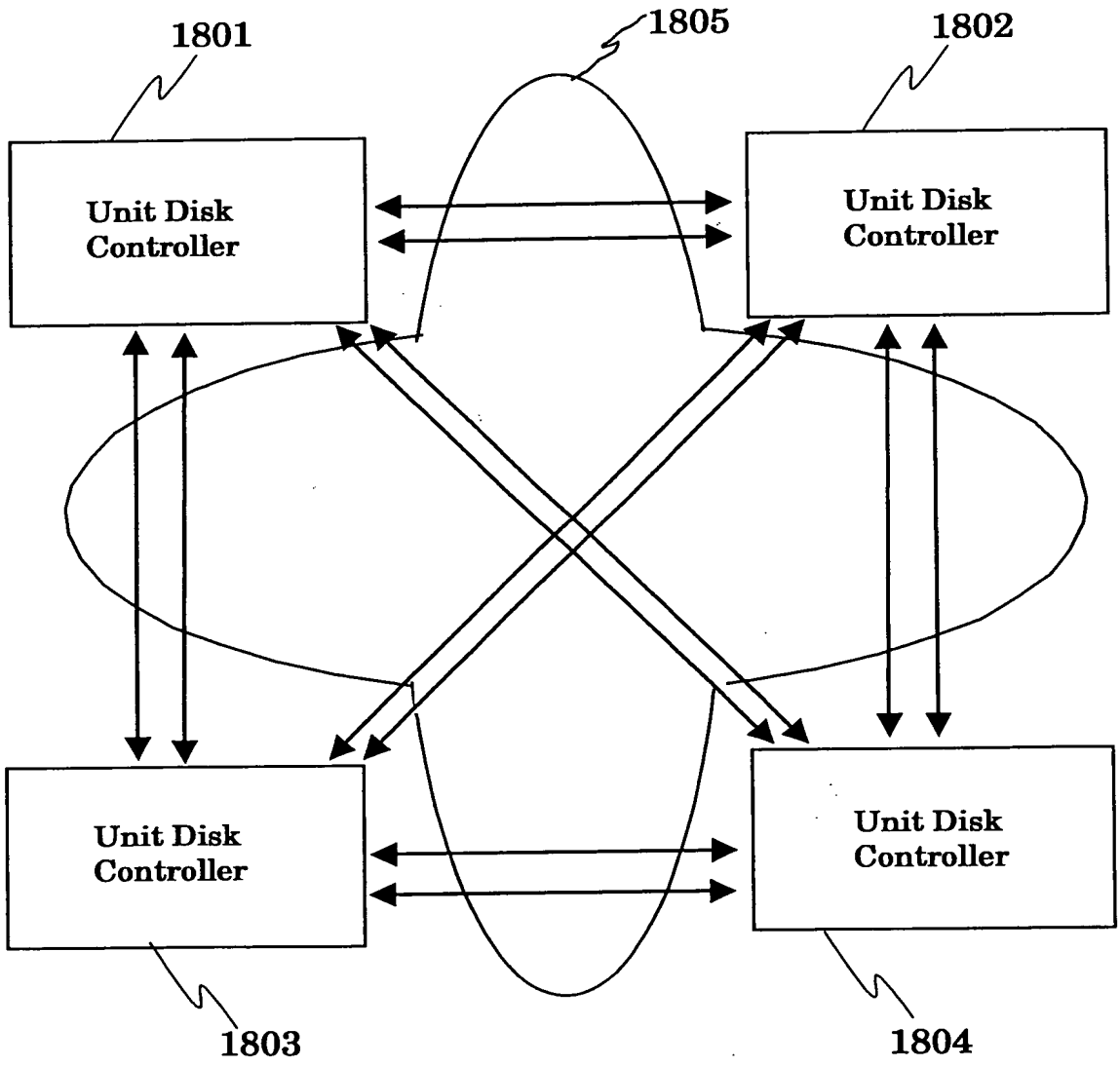

1801
1805
1802
Unit Disk Controller
Unit Disk Controller
Unit Disk Controller
Unit Disk Controller
1803
1804

FIG. 19

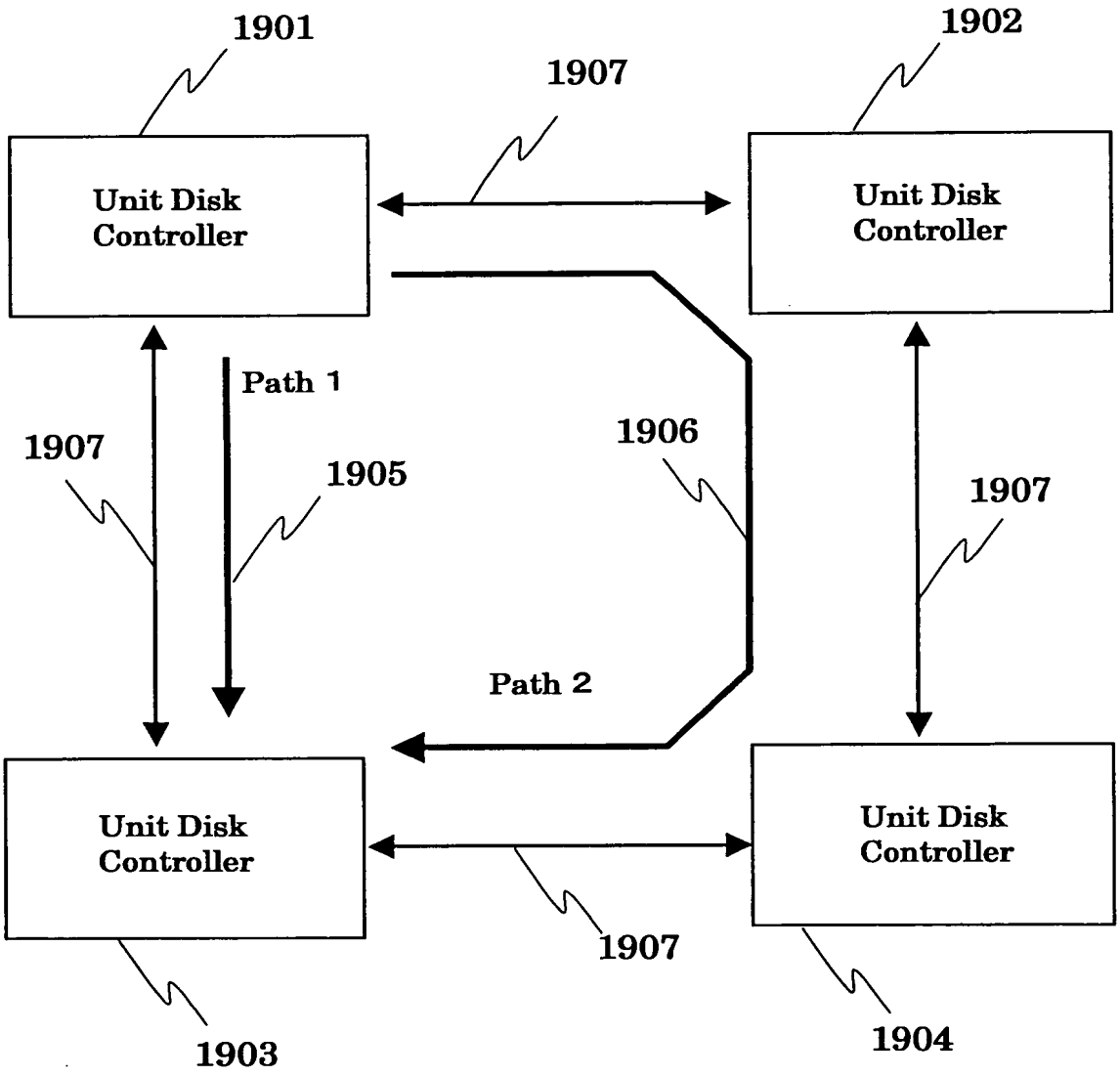

1901
1907
1902
Unit Disk Controller
Unit Disk Controller
Path 1
1907
1905
1906
1907
Path 2
Unit Disk Controller
Unit Disk Controller
1907
1903
1904

FIG. 20

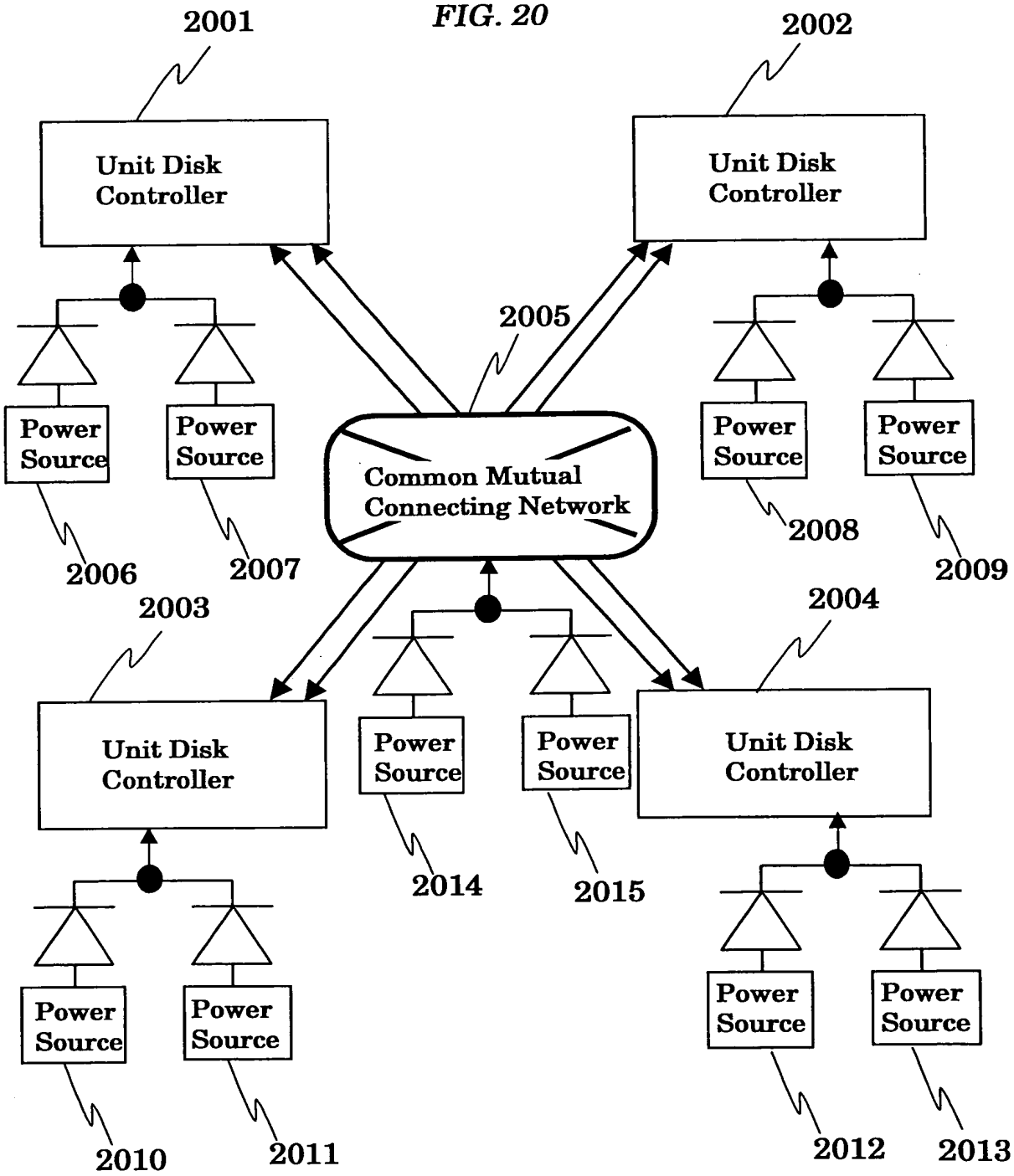

2001
Unit Disk Controller
2002
Unit Disk Controller
2005
Common Mutual Connecting Network
Power Source
Power Source
Power Source
Power Source
2006
2007
2008
2009
2003
2004
Unit Disk Controller
Unit Disk Controller
Power Source
Power Source
2014
2015
Power Source
Power Source
Power Source
Power Source
2010
2011
2012
2013

FIG. 21

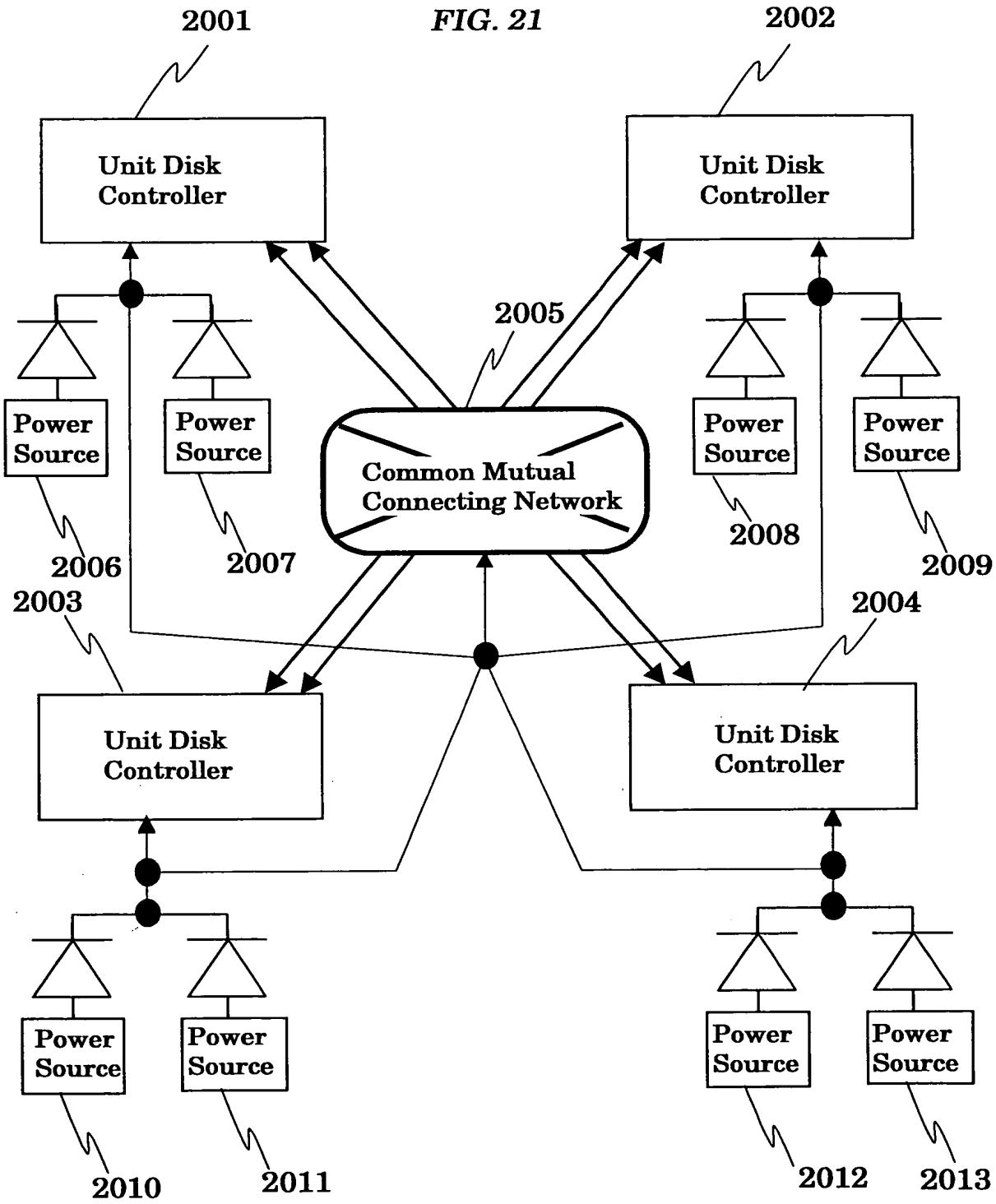
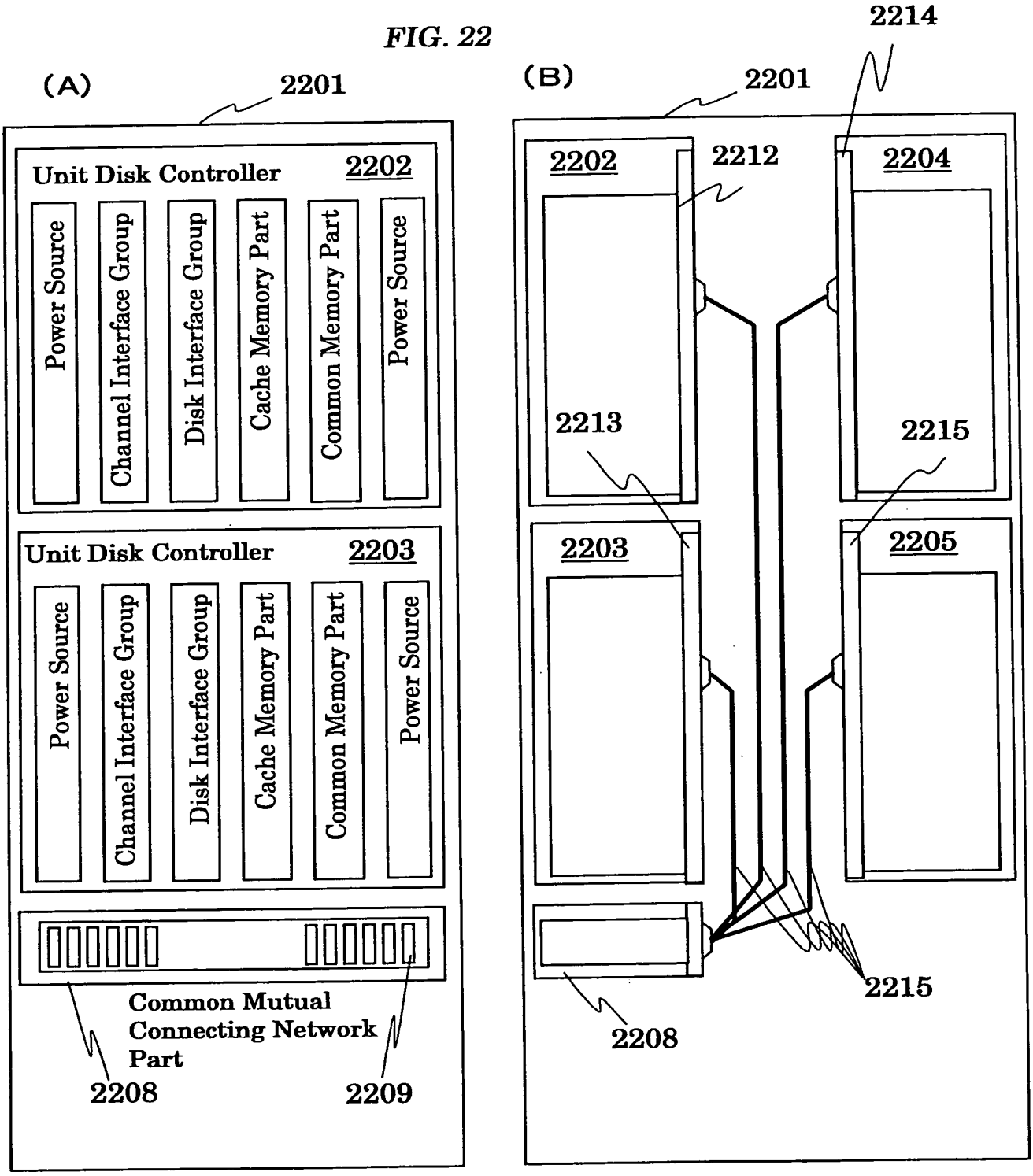

2001
2002
Unit Disk Controller
Unit Disk Controller
2005
Common Mutual Connecting Network
Power Source
Power Source
Power Source
Power Source
2006
2007
2008
2009
2003
2004
Unit Disk Controller
Unit Disk Controller
Power Source
Power Source
Power Source
Power Source
2010
2011
2012
2013

FIG. 22


(A)
2201
Unit Disk Controller
2202
Power Source
Channel Interface Group
Disk Interface Group
Cache Memory Part
Common Memory Part
Power Source
Unit Disk Controller
2203
Power Source
Channel Interface Group
Disk Interface Group
Cache Memory Part
Common Memory Part
Power Source
Common Mutual Connecting Network Part
2208
2209
(B)
2201
2214
2202
2212
2204
2213
2215
2203
2205
2215
2208